

Desktop Platform Education Day

Agenda

- **Significance of PC Chipsets**
- **Integrated Graphics**
- **Balancing the Platform with Memory & I/O**
- **Enabling Software for New Technologies**
- **Analyst Panel**

Significance of PC Chip Sets

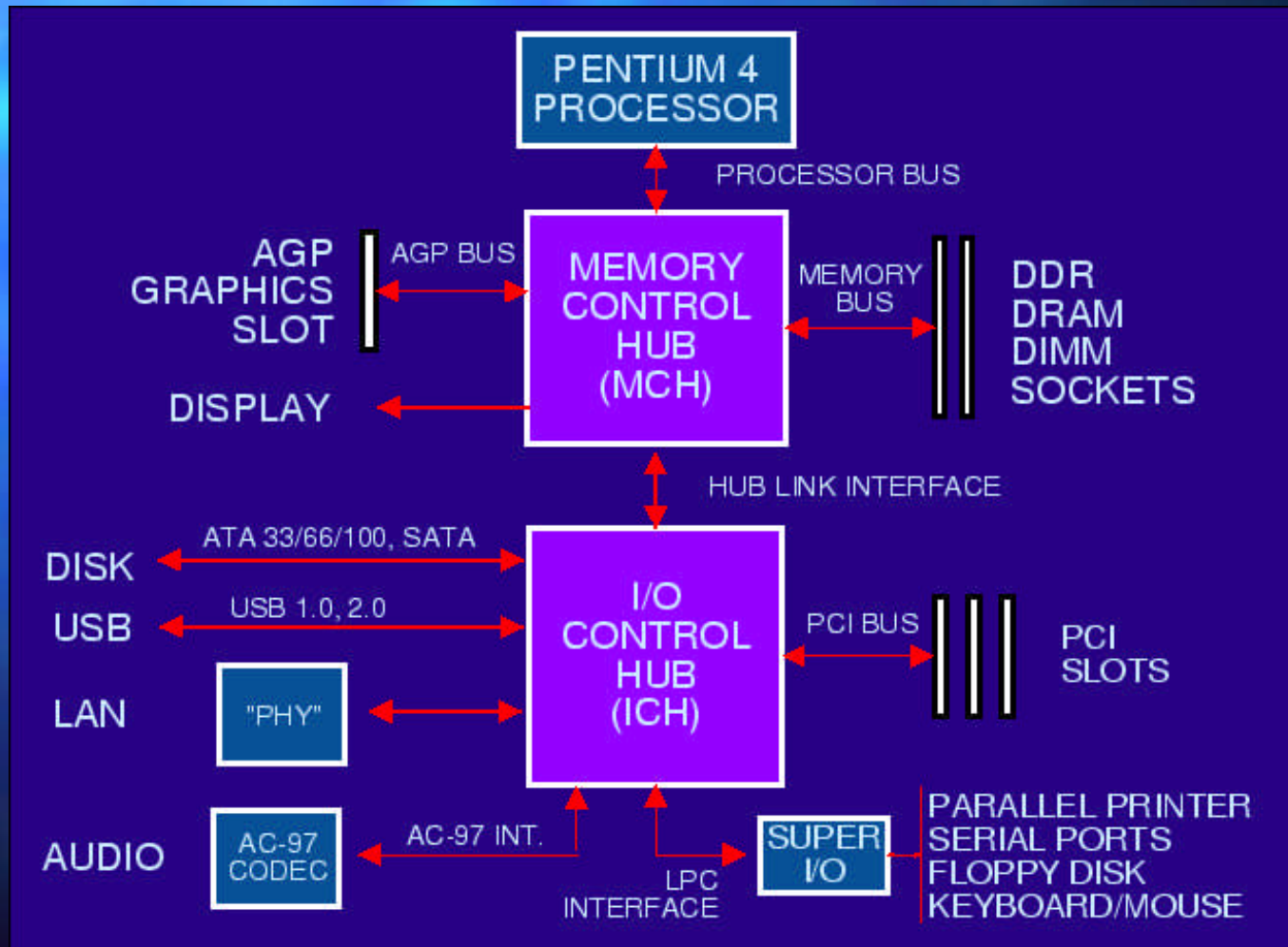
Dean McCarron



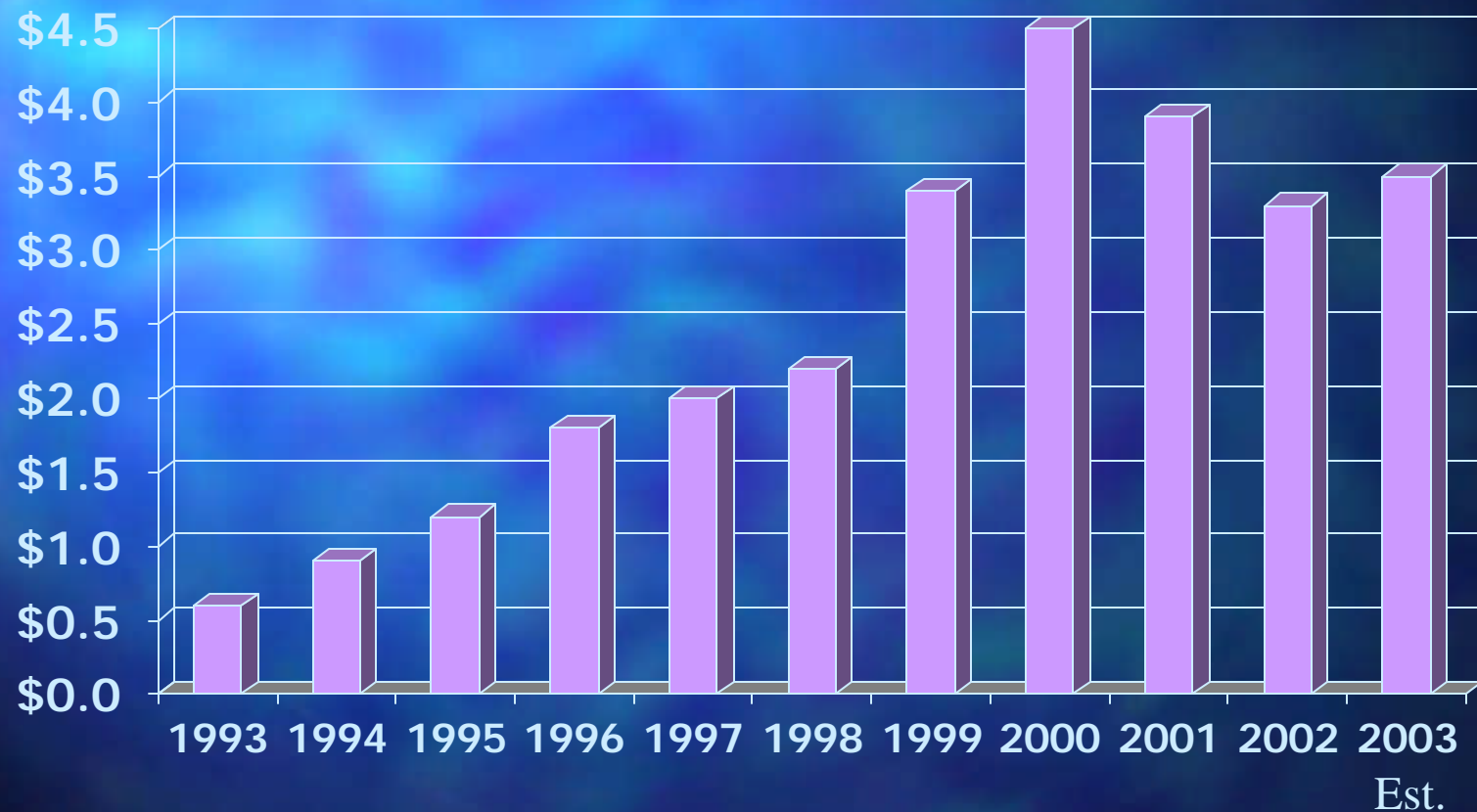
The Role of PC Chip Sets

- Processors = Compute
 - “Thinks” about the software
- Chip Sets = Connect
 - “Acts” on commands from the processor
 - Processor Assistant: Fetch/Save Data
 - Bridge to the world: Communication

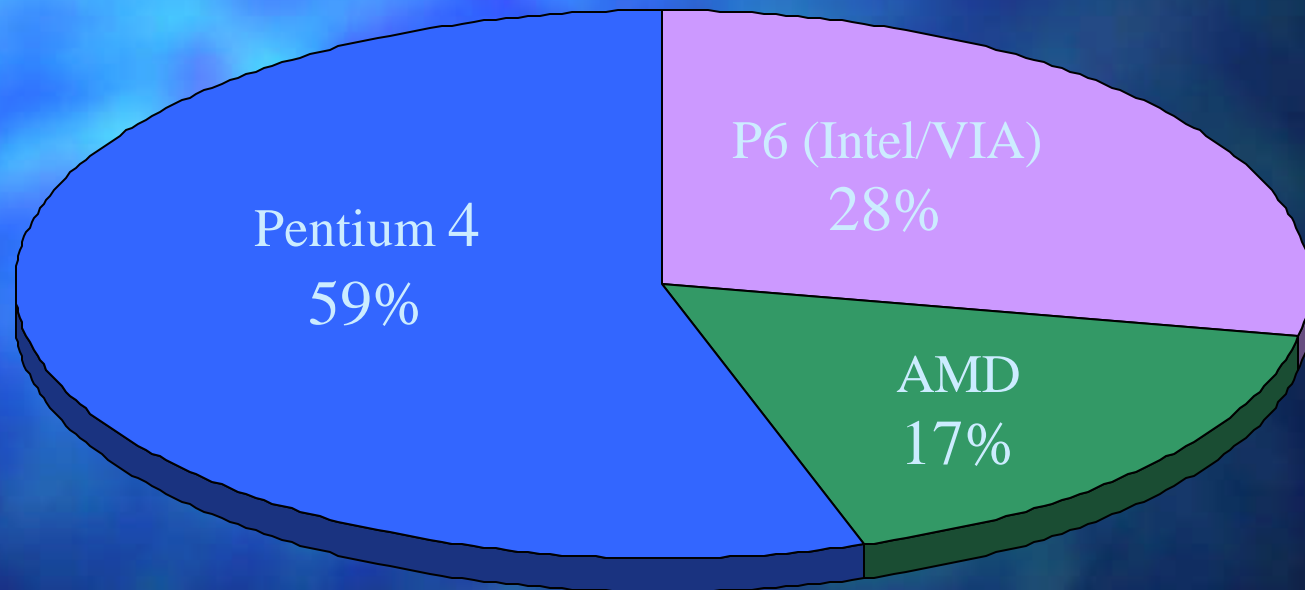
Typical Chip Set in a System



Market Size: \$3.5 Billion

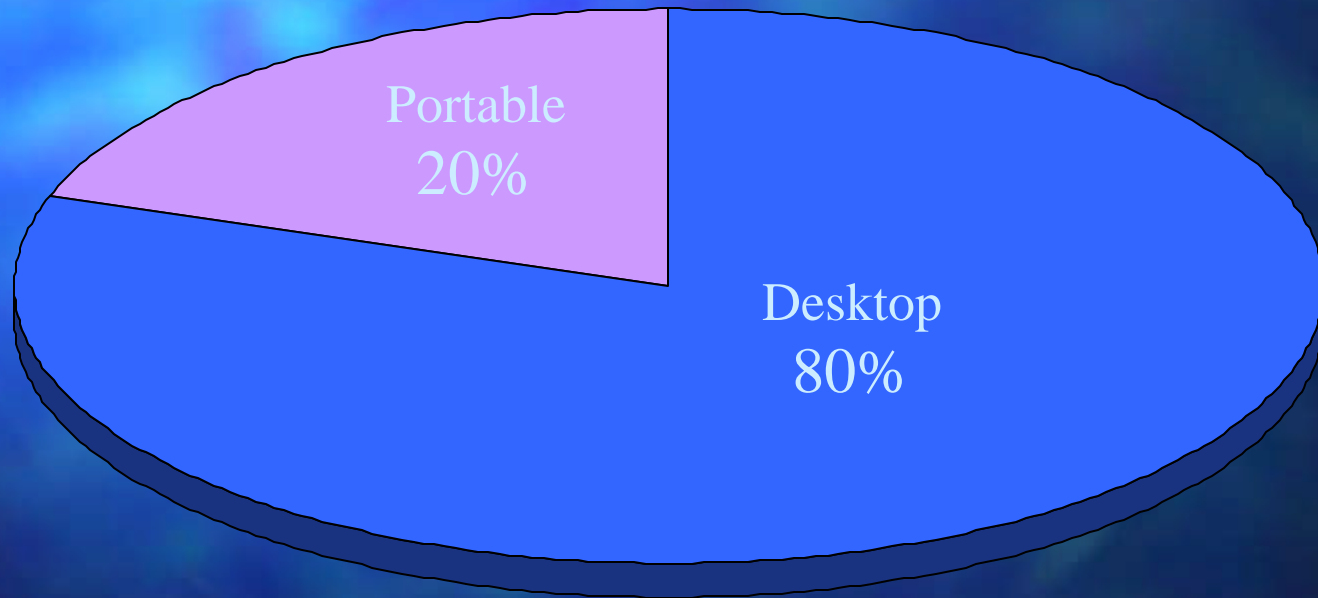


Chip Sets by CPU Bus



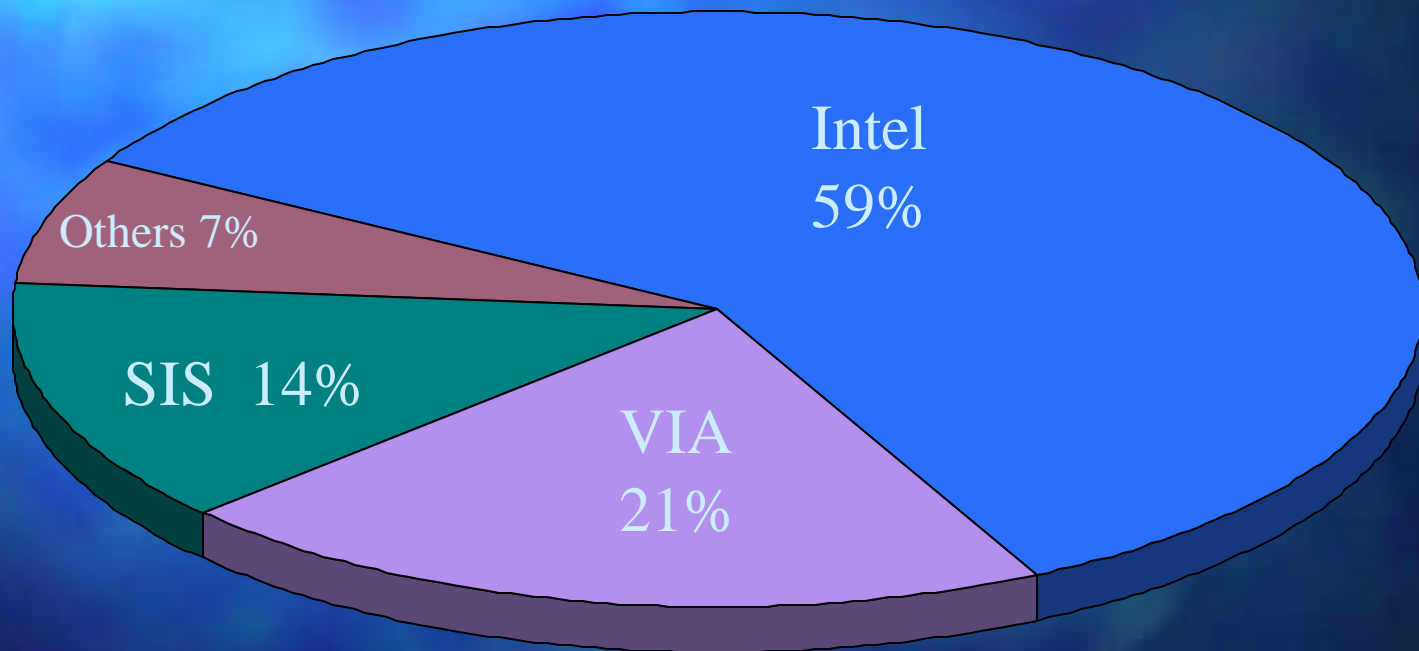
* Total Unit Basis for 2002, TAM = 160 Million Units

Market Segments - Application



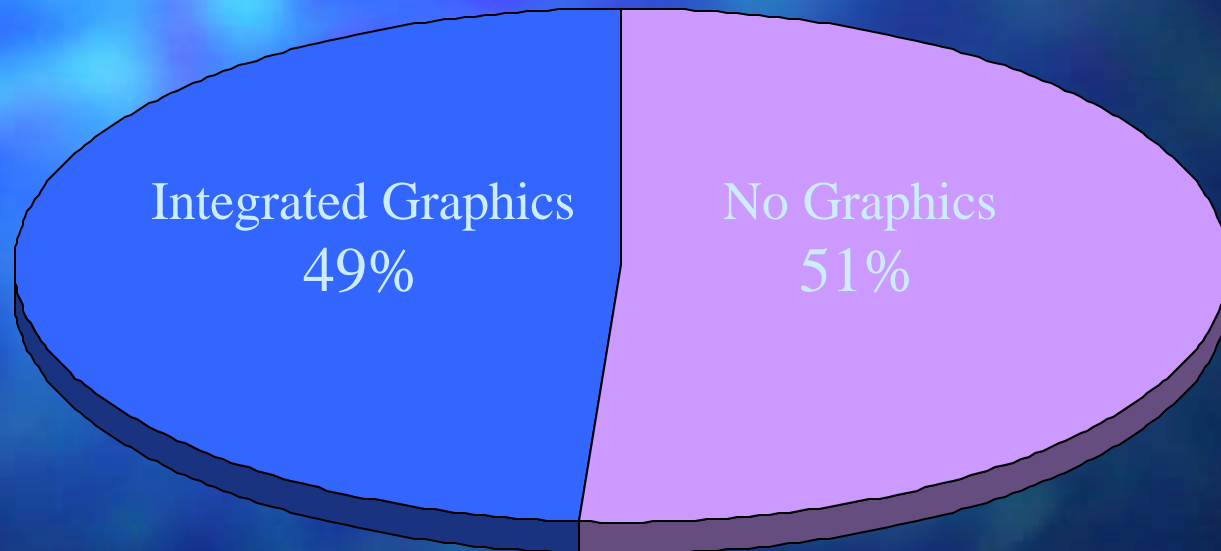
* Total Unit Basis for 2002, TAM = 160 Million Units

Market Players - Chip Set



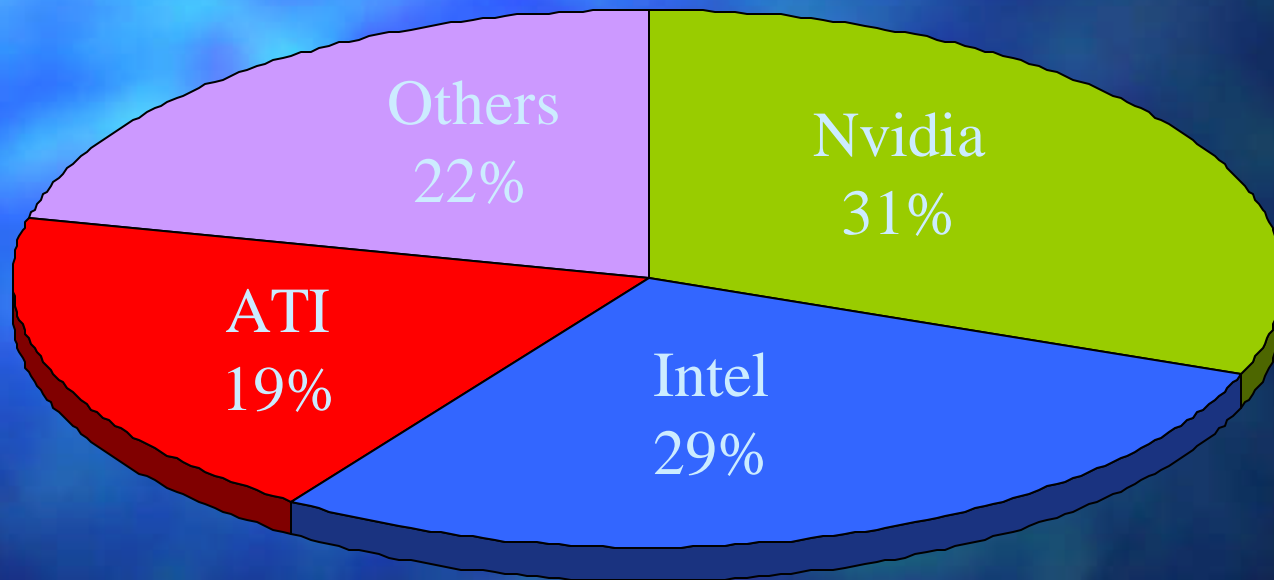
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Market Segments - Graphics



* Total Unit Basis for 2002, TAM = 160 Million Units

Market Players - Graphics



How Chip Sets Evolve

- Managing Costs

- Triggers integration of new functions into chip set

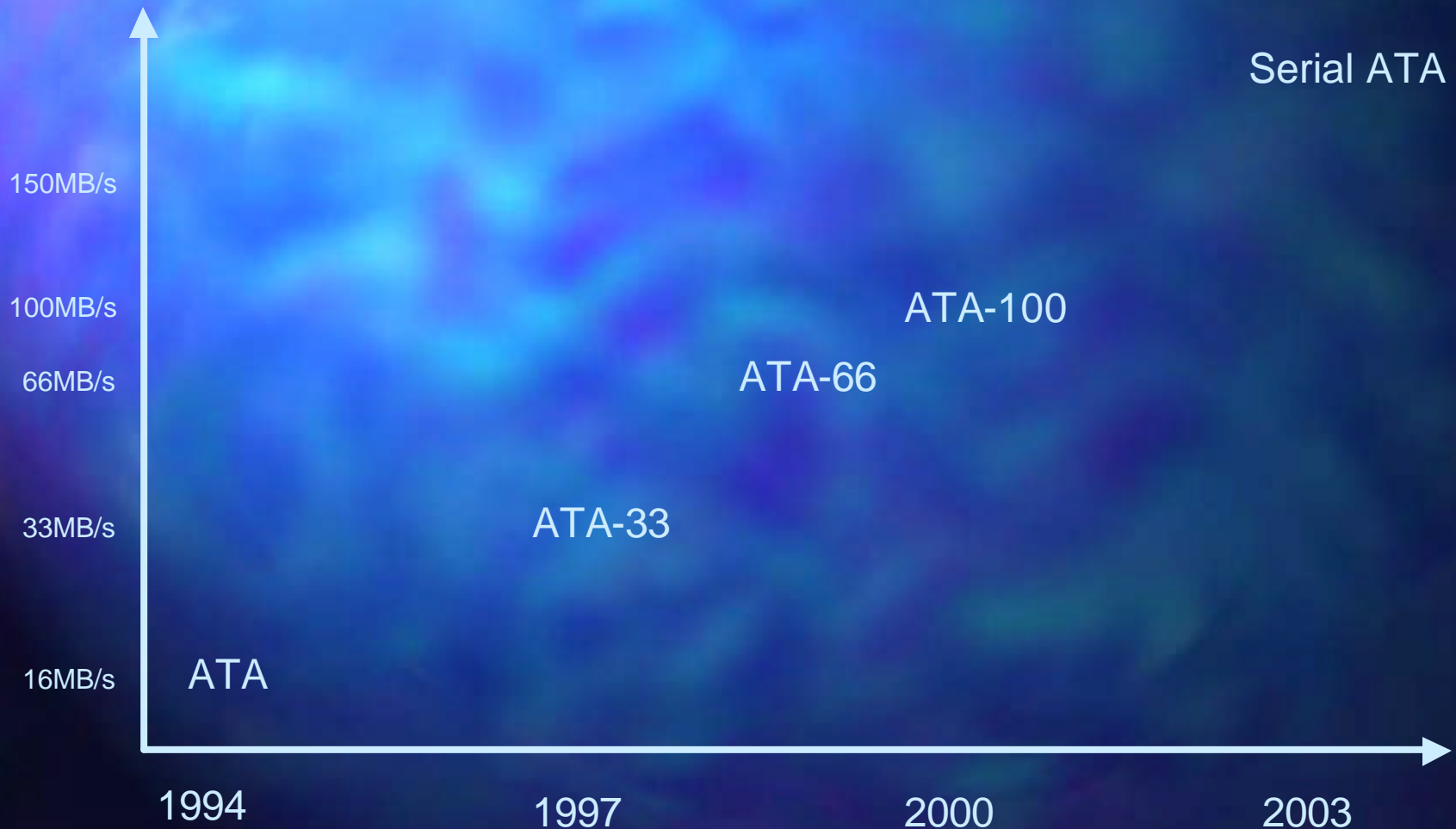
- Balancing Performance

- Triggers upgrades to existing functions

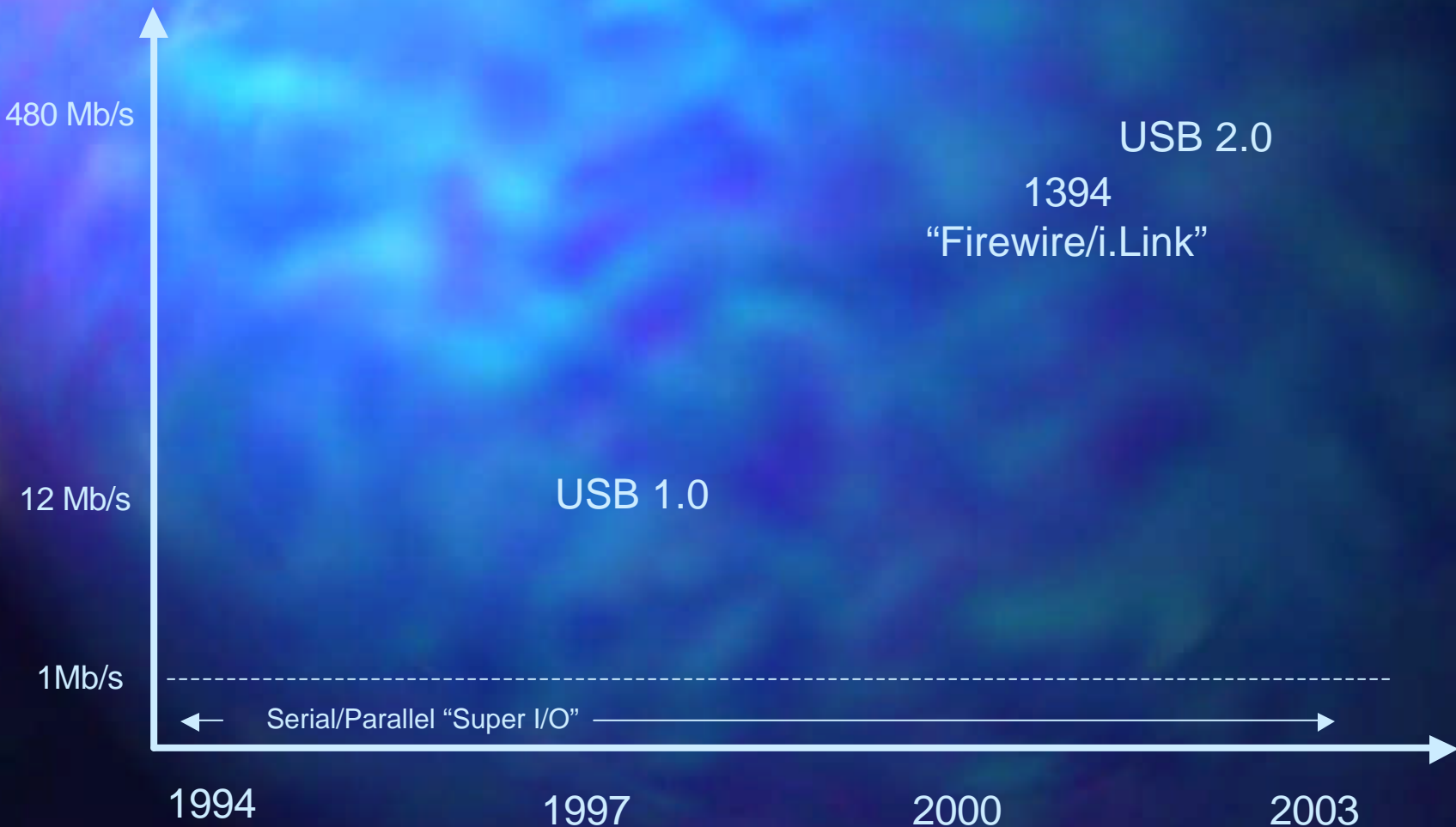
Innovation - Integration Cycle

- Innovative new technologies develop market
- Technology standards established
- Standards result in “commodity”
- Stable, high-demand technologies get integrated into chip sets
- Moore's Law = More transistors for new features

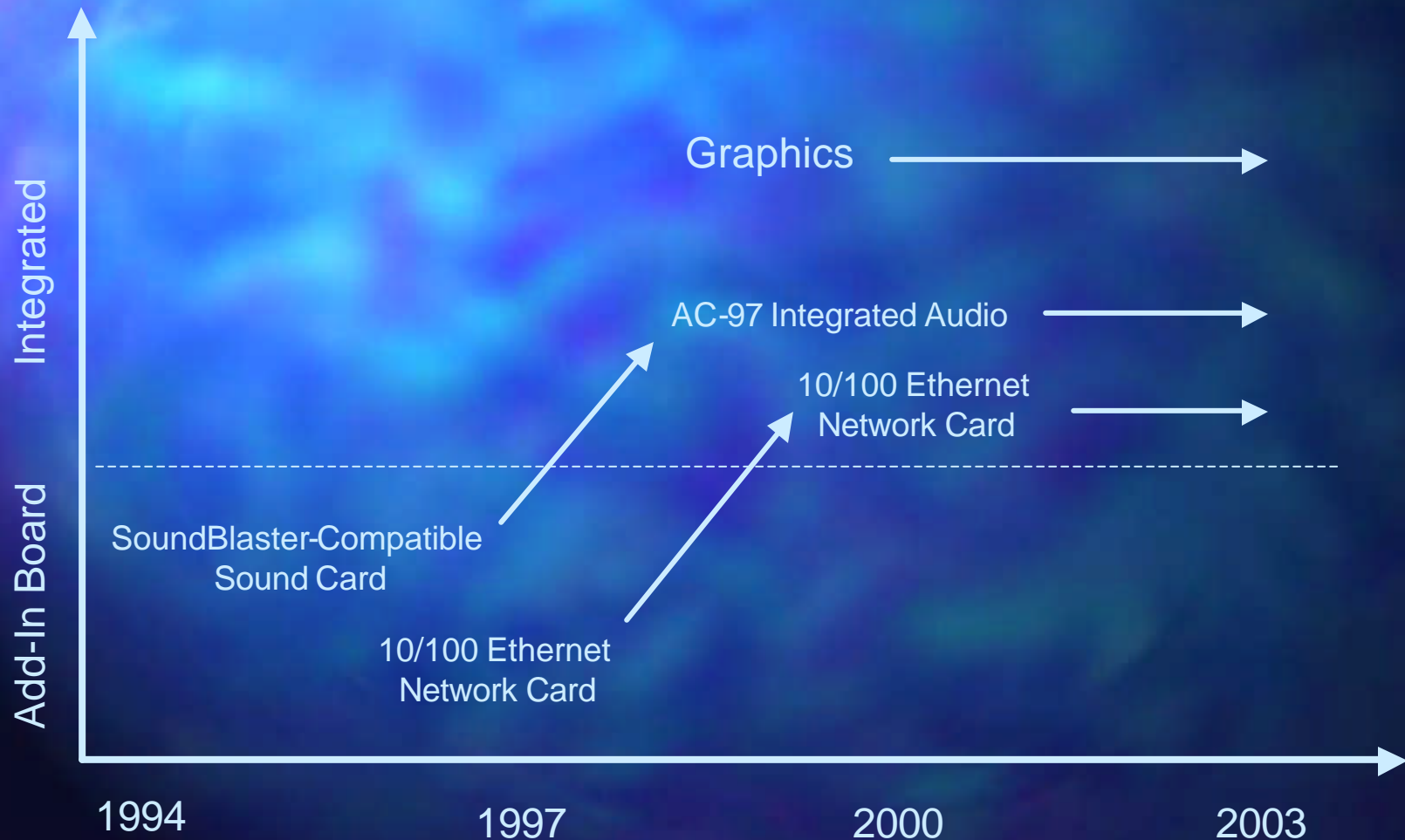
Integration History - Disk I/O



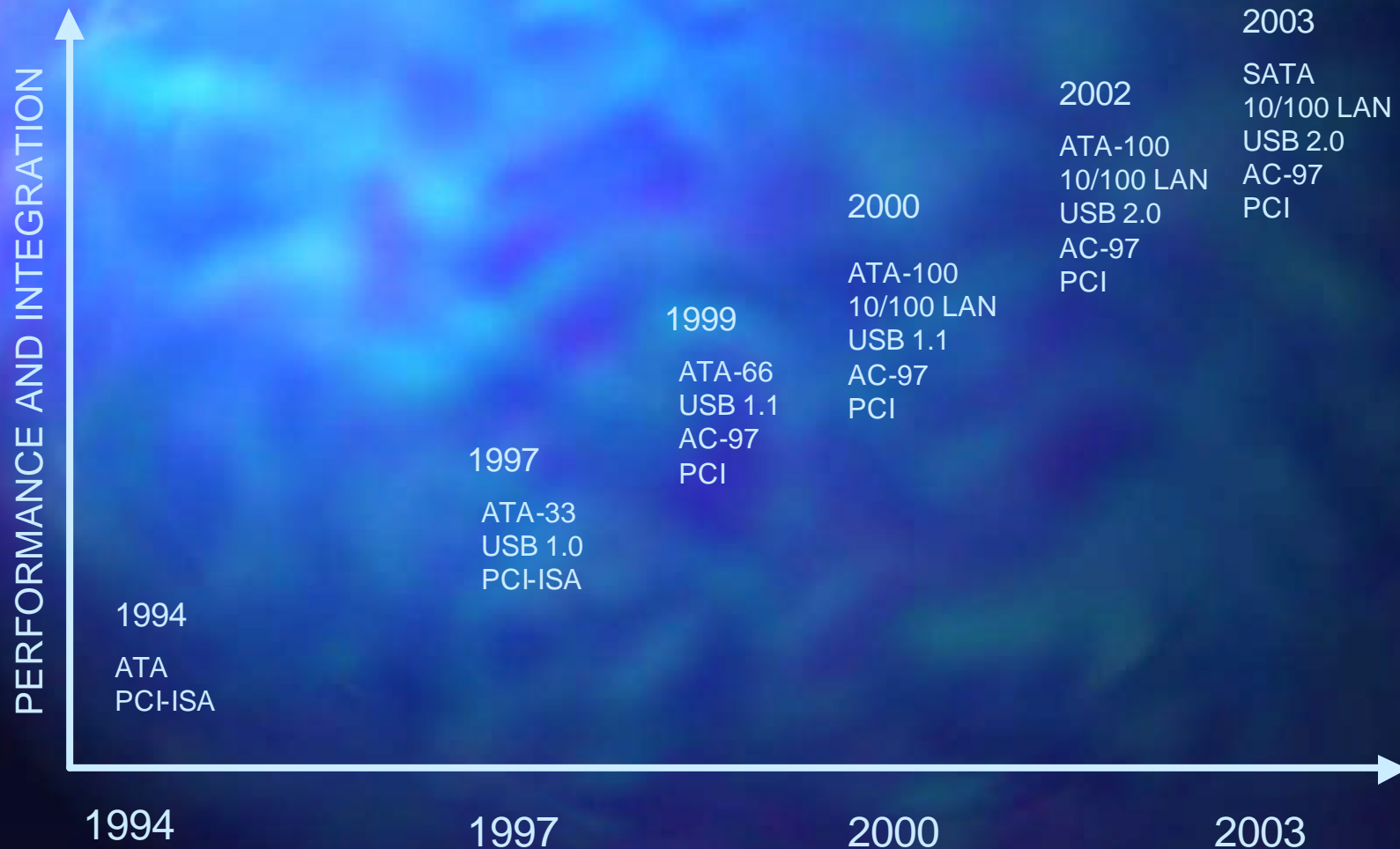
Integration History - Ext. I/O



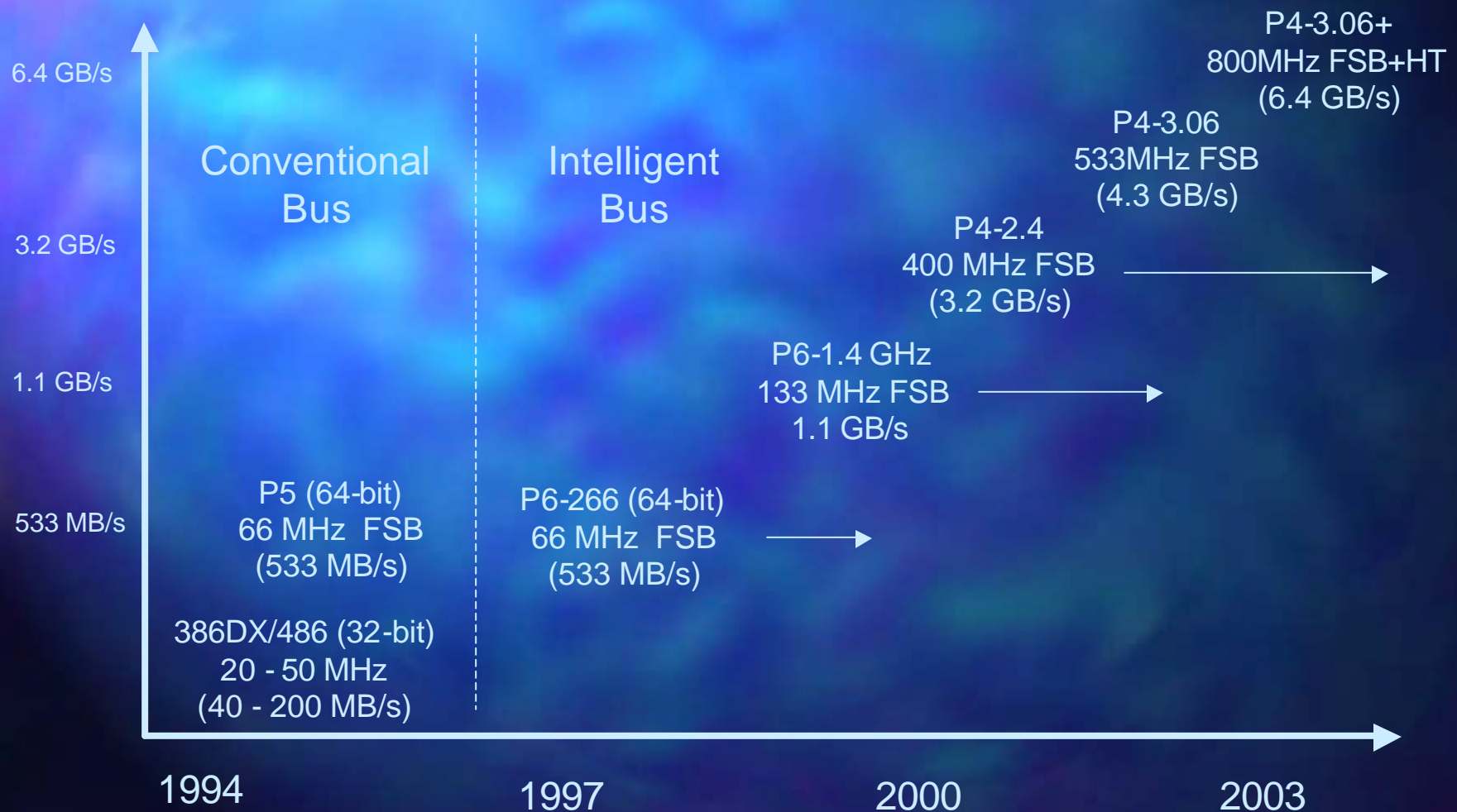
Integration History - Boards



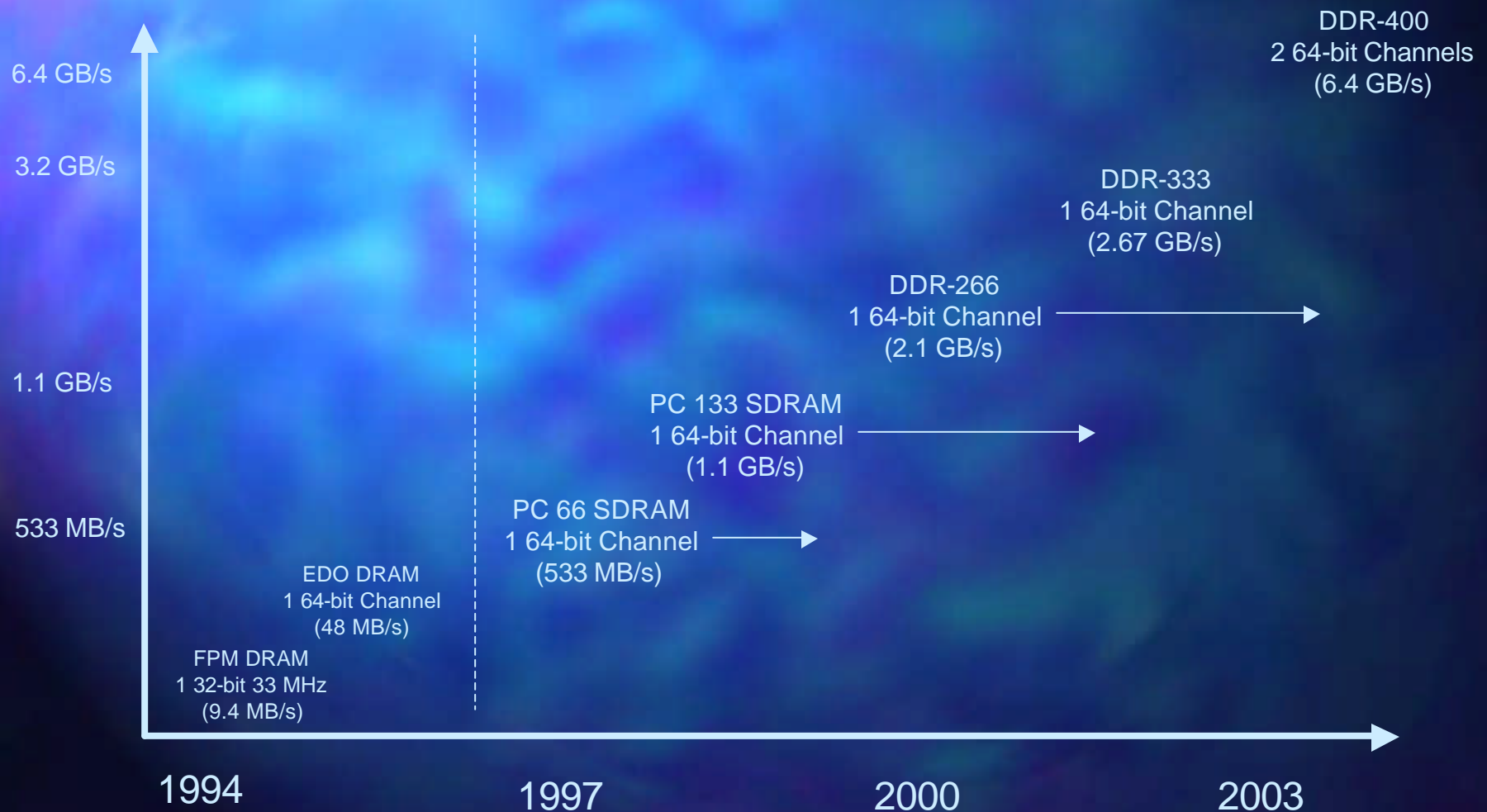
Integration History - Summary



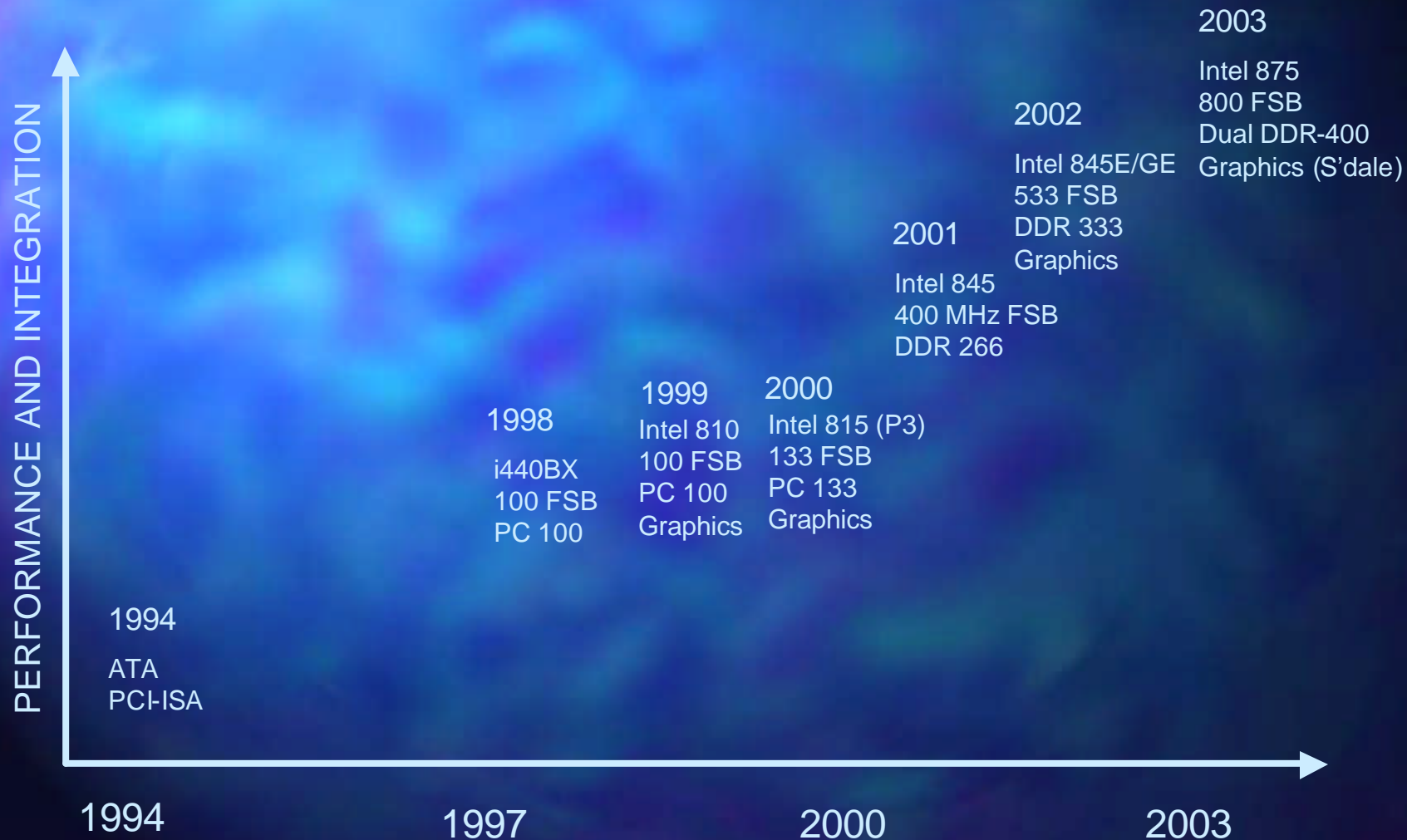
Balancing Performance - CPU



Balancing Performance - Memory



Balancing Performance



Technology Trends

■ Serial Interfaces

- Control cost, help make systems smaller
- USB, 1394, Serial ATA
- PCI Express

■ Closer CPU-Chip Set cooperation

- Multiprocessing
- Hyper-Threading Technology
- Security

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Integrated Graphics

Tom Piazza

Intel Fellow

Director of Graphics Chipset Architecture

Agenda

Integrated Graphics – What Is It

Integrated Graphics Solutions

History and Performance Trend

Intel® Extreme Graphics 2

Optimization Challenges

Summary

Integrated Graphics – What Is It

- **Integrated graphics engine within mainstream and value chipsets**
- **Replacement for more expensive add-in graphics card solution**
- **Intelligently shares main system memory with graphics applications**
- **Viable solution since applications are modal**

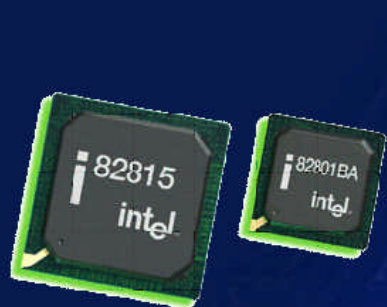
Integrated graphics is a significant part of Intel chipset strategy

Integrated Graphics Solutions

- **Integrated graphics is preferred mainstream and value solution**
 - Integrated graphics market segment share on the rise
- **Intel integrated graphics solution**
 - Great performance for mainstream market at minimal cost
 - Extensive investment in design, validation, and support
 - Software driver quality and compatibility

Intel is the largest producer of integrated graphics, and will continue its market leadership position in 2003 and beyond

History & Performance Trend

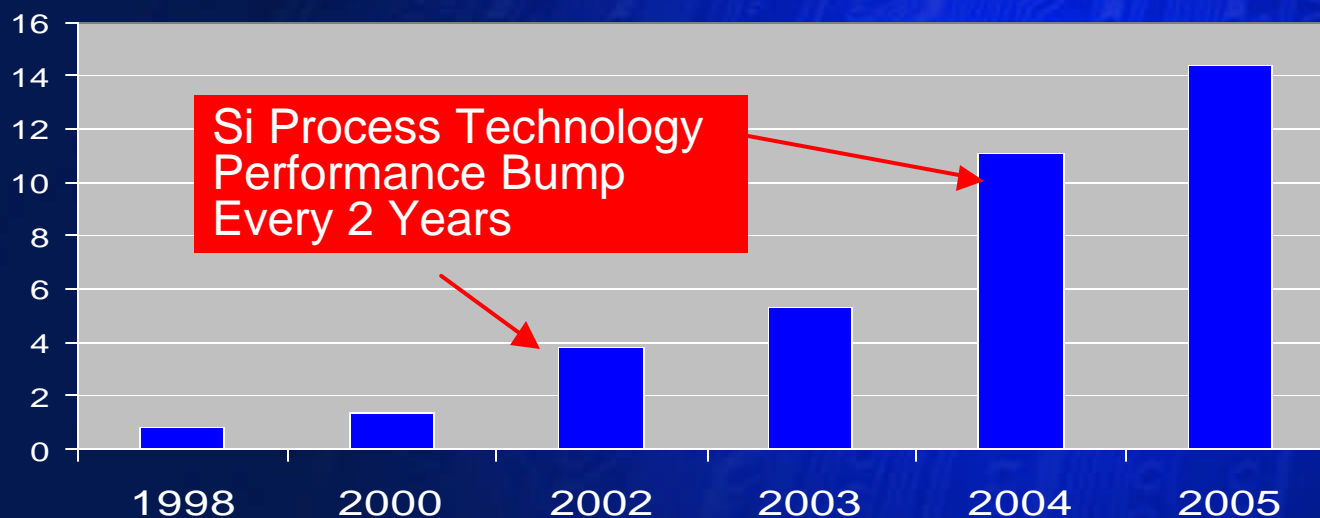


Intel® 815E chipset



Intel® 845G chipset

Graphics Performance

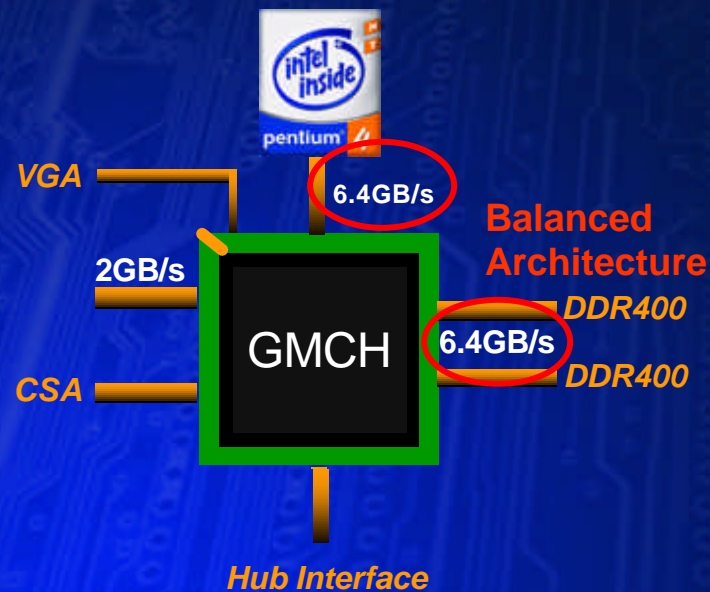


Integrated Graphics is on same trend line as best discrete devices at lower cost and ~2 year lag in performance

Intel® Extreme Graphics 2

- **New & enhanced graphics engine**
 - Zone Rendering Technology
 - Rapid Pixel and Texel Rendering
 - Dynamic Video Memory Technology
 - Intelligent Memory Manager
 - True color support
 - Video and display enhancements
- **Architected to take immediate advantage of dual channel DDR**

GMCH Architecture



Intel is Leading Integrated Graphics Technology

DEMO

Optimization Challenges

- **Performance limited by main memory subsystem**
 - Graphics BW limited by commodity bulk DRAM dejour
- **Not just a repackaging of a discrete component into a chipset package**
- **Special design considerations for integrated graphics**
 - Minimizing the BW requirement for Integrated Graphics a significant optimization point
 - Caching, memory management, addressing “tricks”, memory arbitration are key
 - Arbitration to memory more complex

Summary

- **Springdale chipset delivers performance for today's business & mainstream consumer needs**
- **Intel will continue to deliver leading integrated graphics solutions**
- **Intel is committed to continue raising the bar on integrated graphics capabilities**

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Balancing the Platform with Memory and I/O

Pete MacWilliams

Intel Senior Fellow

Director of Platform Architecture

Bill Leszinske

Desktop Chipset Software Marketing Director

Agenda

Importance of System Memory

Advancements in Desktop Memory Performance

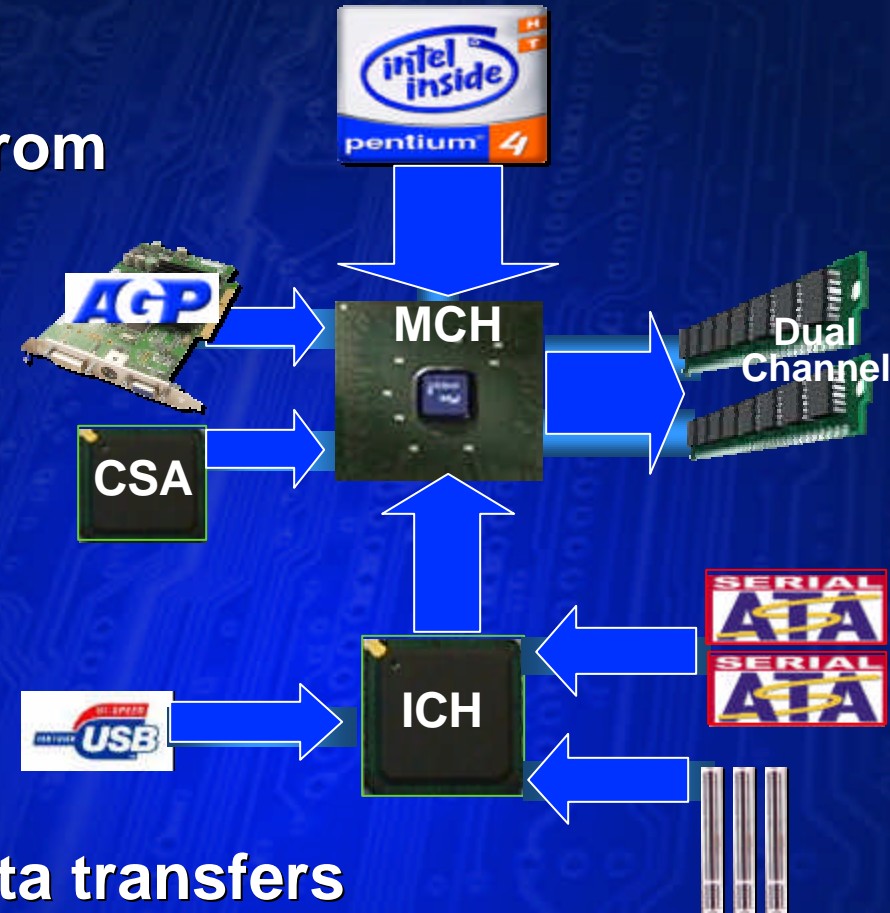
Architectural Design & Enabling Challenges

The Future of Desktop Memory

Importance of System Memory

- **Key system devices benefit from memory performance**

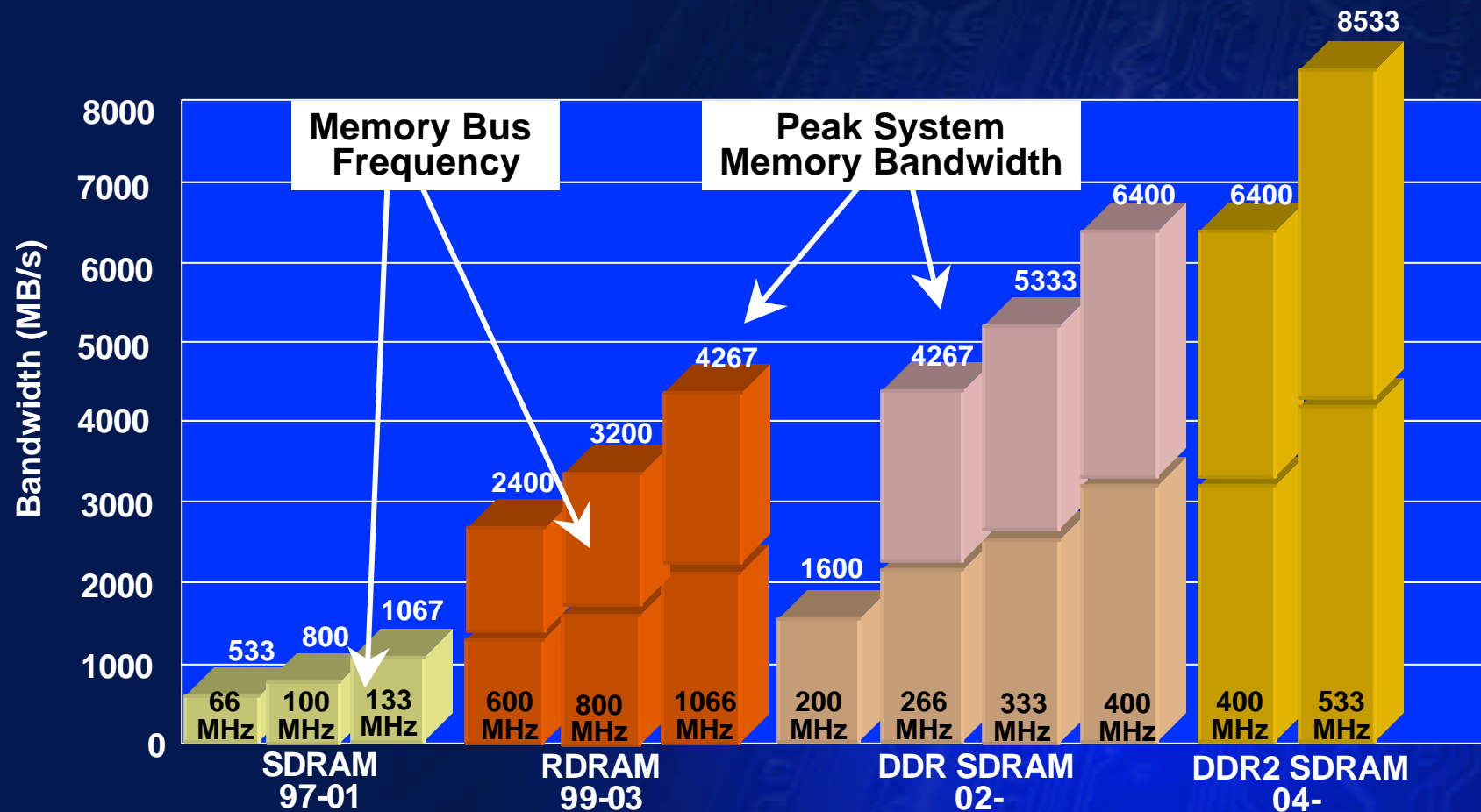
- CPU with 800 MHz FSB
- AGP 8X (Graphics)
- CSA devices (GbE)
- Fast Serial ATA Disk I/O devices
- Multiple USB devices support
- Multiple PCI devices support



- **Many applications require data transfers to move through system memory**

System memory and Memory Controller Hub (MCH) play a key role in overall platform performance

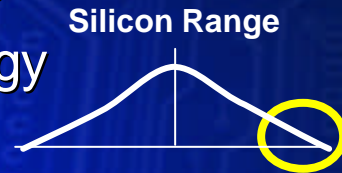
Advancements in Desktop Memory Performance



- Memory frequency scaling aggressively, but not enough
- Wider memory required for best performance
 - Dual Memory Channel Capability important

Architecture Design and Enabling Challenges

- **More complex memory controllers required to realize memory performance**
 - Logical management of memory to improve latency and efficiency
 - Compensation to improve electrical interface performance
 - Opportunity for Intel® Performance Acceleration Technology
- **Robust methodology for memory technology enabling**
 - Agree on DRAM component & DIMM specifications with the industry
 - Validation of DRAM components & DIMMs
 - Platform collateral for each chipset
 - Volume



Intel will continue to lead platform and memory technology advances in the future

The Future of Desktop Memory

- **Memory will continue to be an important ingredient for a balanced platform**
- **Working with the industry on next steps for DDR2 and beyond**
- **Complete platform solutions important - memory performance is necessary but not sufficient**

Agenda

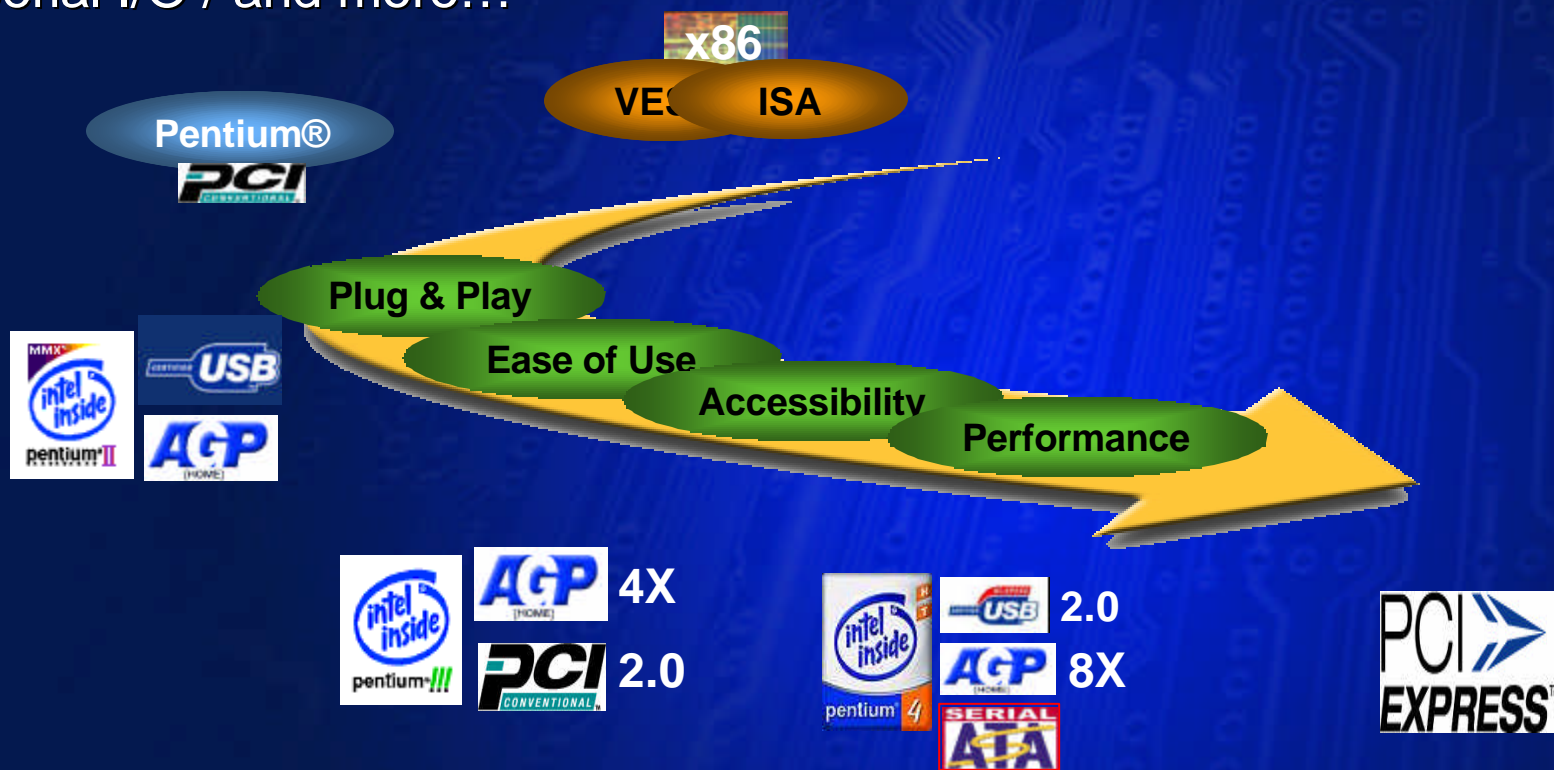
The Evolution of Desktop I/O

I/O Performance Demand

The Future of Desktop I/O

The Evolution of Desktop I/O Architecture

- Increasing Desktop Local & Standard I/O Performance with Every new Platform Generation
 - High Performance Graphics / Video / Audio / Disk & Memory I/O / Serial I/O / and more...



Intel is Leading the Efforts to Improve I/O and System Performance

New Usage Models Demand Higher CPU & Platform I/O Performance

- High-bandwidth, High Speed Graphics, System memory, and System Bus
- Dedicated High Speed Networking Bus
- Enhanced 6 channel audio



**Broadband /
Telecom / Broadcast**

**Streaming Audio
MP3 Playback**

**Streaming Video
/ DVD Playback**

Advanced Gaming

DEMO

The Future of Desktop I/O

- I/O Performance Demand is on the rise
- Users want more realistic 3D graphics, higher resolution video, and HD TV capability on their desktop
- PCI Express: performance scalability for the next decade
- Intel is leading efforts to improve I/O & platform performance



Delivering performance for the next decade

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Enabling Software for New Technologies

Kim Pallister

**Technical Software Strategist
Software Solutions Group**

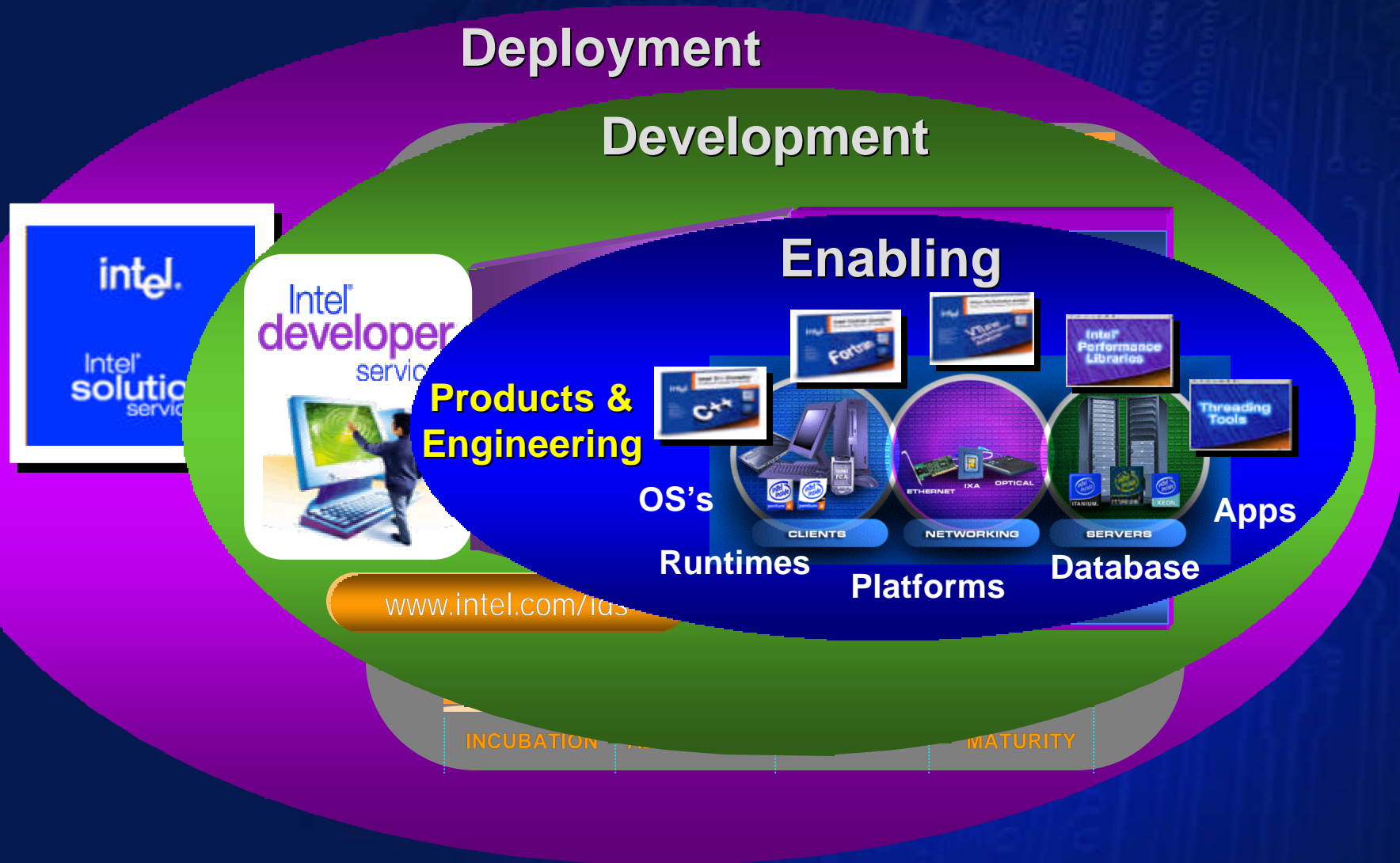
Agenda

- **Intel's role in the software community**
- **Increasing Complexity of Software**
- **Changing Usage Models**
- **Examples & Demo**

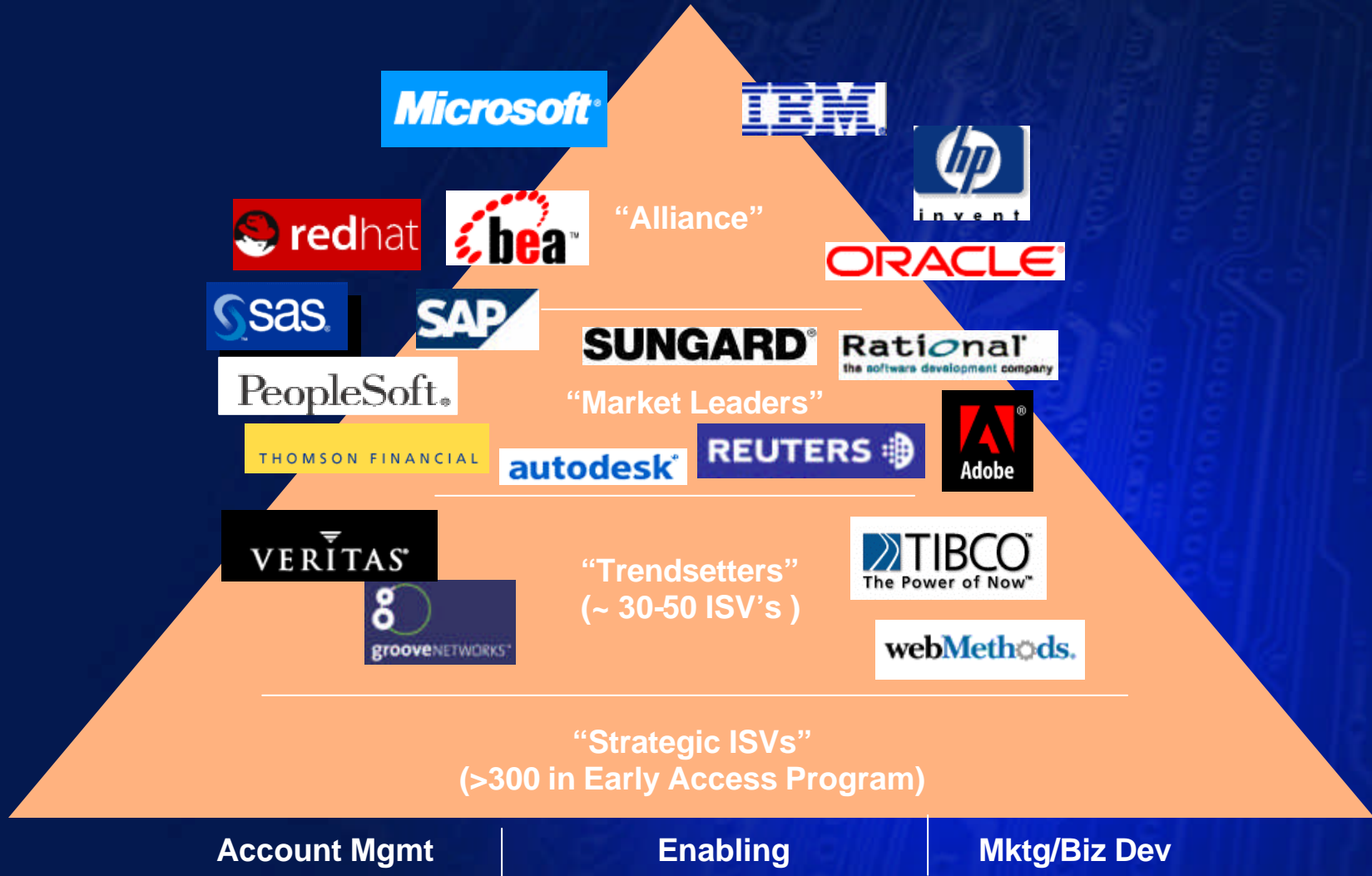
Quick Facts

- **Intel, known for great silicon... has a prominent role in driving software and solutions on and for Intel technologies**
- **Intel has over 6000 Software Engineers**
 - 30% Designing Software and Solutions to run our Business
 - 70% Developing Products, Technologies and Services
- **Intel has 18 Solution Centers worldwide to advance and build Intel-based solutions**
- **Implementing our own e-Business Solutions**
 - Connecting our Trading Alliances with RosettaNet

Software and Solutions Enabling



Snapshot: Software and Solutions Customers



Intel focused on delivering complete platform solutions

What We Bring to the Table

- Support that goes beyond optimizations
- Technical and go-to-market value
- Expand the ISV's market – bring real value
- Technology that provides SW feature extension
- Make the ISV's job easier

Enabling the ecosystem for software developers

Trends in Software & Usage Models

- Applications growing in complexity & cost
- Rich media is commonplace in applications
- Multitasking is the norm
- New Usages demand more performance (media, connected devices, collaboration, etc)

*Developers are turning increased performance into increased productivity, creativity, and fun.
HT Technology can deliver that performance*

Enabling the ISV Community for Hyper-Threading Technology



Tools to ease adoption: Threading Toolkit, VTune Performance, Intel Compiler, IPP Libraries...

Real Go-To-Market Value for Technology Leaders



Support that goes beyond optimizations

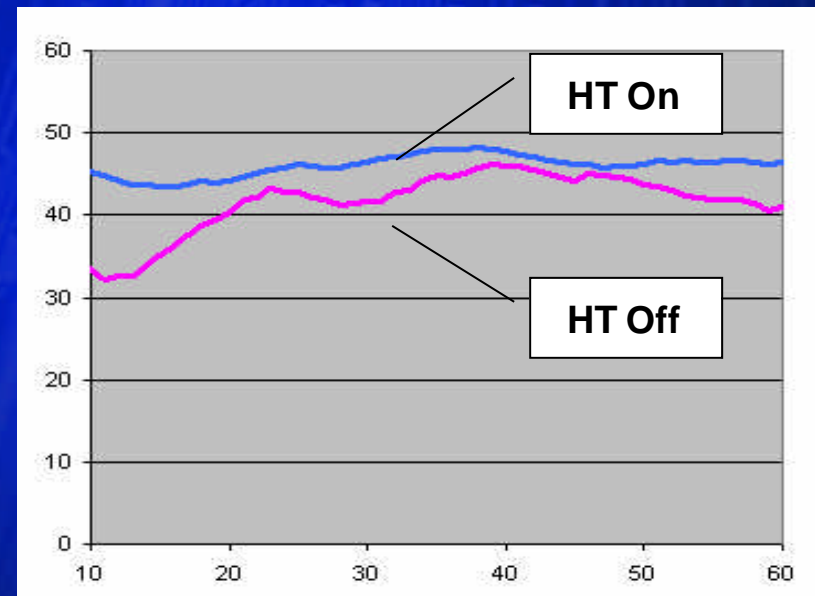


Differentiation Through Technology



- Example: Lejendary Adventures
- Developer: Dreams Interactive
- Early access to technology and expertise helped developers push technical envelope

- Hyper-Threading Technology Optimizations yield up to 20% frame rate increase¹
- Threads spawned to generate higher tessellation on terrain (smoother, more detailed landscape & water simulation)



¹ – Increase of frame rate measured on Pentium 4 processor 3.06 GHz based system with HT Technology on/off while flying over landscape.
Frame rate graph based on running 10-frame average

Summary

- **Technical trends point to new usages and continued performance demand**
- **Hyper-Threading Technology will help deliver the performance needed for these**
- **Intel provides not only technical know-how, but go-to-market programs and opportunities that contribute to the ISV's overall business success**

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Analyst Panel: Enterprise Computing

Roger Kay

Director of Client Computing, IDC

Steve Kleynhans

Vice President, Workgroup Computing Strategies, META Group

Martin Reynolds

Vice President and Research Fellow, Gartner Group

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Thanks For Coming!